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AN ECONOMIC ANALYSIS OF ALTERNATIVE TRAY PACK SIZES

BY

MARK M. DAVIS
BENTLEY COLLEGE, WALTHAM, MA

AND

DONALD J. BILLONI

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MARK M. DAVIS* and DONALD J. BILLONI**

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

Bentley College
Operations Management Department, Rauch Administration Building
175 Forest Street
Waltham, MA 02254
(Under Intergovernmental Personnel Act {IPA} Assignment Agreement)

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In March 1989, the U.S. Army Quartermaster School requested Natick to analyze the effects of converting the current tray pack container to a 6/9 and to an 8/12 portion tray pack container.

Force structures for field feeding were derived from data collected at Fort Carson, CO. Nine field feeding profiles were established from several task force level organizations, and personnel fed ranged from 480 to 928 troops at 6 to 18 field feeding sites. These profiles were matched against five tray pack modules, which showed overissue data for the various combinations. Additionally, actual food waste was recorded during a field training exercise. Also, an industry survey was conducted to estimate the economic impact of converting/retooling for the proposed tray pack sizes. These conversions were found to be cost-prohibitive.

Results showed the current half steam table size, when configured for the 18-person meal module, to be the most cost-effective alternative.

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SUMMARY

Introduction

Food waste is constantly being generated when tray pack meals are served to troops during field training exercises. This food waste can be attributable to several causes. However, this study focuses on the waste generated by the disparity between the current meal module/tray pack configuration and the relatively small numbers of troops that are eating at remote sites. Alternative meal module/tray pack configurations are evaluated with the goal of reducing the total cost per meal of feeding troops in the field. The impact of adopting a tray pack size other than the one currently being used is discussed in terms of industry conversion costs and incremental logistical costs within the federal government's distribution system.

Data Collection

For consistency, the 14-day menu that was used for evaluating alternative module sizes in the 1987 report titled *Meal-Module, Tray Pack, 36-Persons,* has been adopted for this analysis.* Troop strength profiles at remote feeding sites were obtained during a June 1989 trip to Fort Carson, CO by Mark M. Davis, Donald J. Billoni, and Richard Maffei (Natick intern). In addition, actual food waste data, generated during field training exercises, were also collected. Estimates of industry conversion costs were obtained through meetings with representatives from both the tray pack can manufacturer and also the food processors that currently have contracts to produce tray pack items.

Analysis

A Lotus-123 program was developed to determine the average food item costs for the 14-day menu, for different combinations of tray pack, and for different module sizes. Two sizes of conceptual tray packs were evaluated: one at 50% capacity of the current tray pack and the other at 67% capacity. In addition, each of the tray pack sizes were costed at different levels to reflect probable diseconomies of scale that are likely to occur with the proposed smaller size units. The five different module sizes included in this analysis ranged from 12-person to 36-person, in 6-person increments.

Using the troop headcount profiles that were collected at Ft. Carson, Table I was generated from the program to show the impact on food item costs for each of the different combinations of tray pack and module sizes. These food item costs are in FY 88 dollars. The per meal costs of the three alternative sizes which include industry conversion and food waste are shown in Table II. The costs are in FY 89 dollars. However, the relative comparison of the costs on page vi to each other remain accurate.

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*Drago, N.E., Hill, B.H., and and Nelson, K.D., "Meal Module, Tray Pack, 36-Persons, "Technical Report NATICK/TR-87/045, Food Engineering Directorate, U.S. Army Natick Research, Development and Engineering Center, Natick, MA 01760-5000, August 27, 1987.

TABLE I. Average Food Item Costs per Meal.

Tray Pack Capacity	Tray Pack Cost	Module Size 12	18	24	30	36
100%	100% (Current)	2.69	2.02	2.71	2.56	2.24
50%	50%	2.69	1.96	2.16	2.52	2.24
50%	60%	3.13	2.28	2.54	2.94	2.61
50%	70%	3.58	2.61	2.91	3.35	2.98
67%	67%	2.08	2.50	1.97	2.54	2.26
67%	75%	2.28	2.76	2.18	2.80	2.50
67%	80%	2.40	2.93	2.31	2.95	2.64

Although the lowest average food item cost, which results in a savings of 12.5% over the current configuration, is obtained when the 18-person module is used in conjunction with the 50% capacity tray pack, this cost does not reflect any diseconomies of scale. However, the 18-person module, in combination with the current size tray pack yields a savings of 9.8% over the current configuration, which accounts for 78.5% of the savings realized with the smaller size tray pack.

A comparison between actual food waste data that were collected at Ft. Carson and the theoretical waste caused by overissues reveals that substantial food waste is currently being generated that significantly exceeds that attributable to overissue quantities. This waste appeared to be most significant for breakfast items, where the actual food waste is approximately three times the theoretical quantity. In contrast, the actual food waste noted with dessert items more closely approximated the theoretical overissue amounts, the actual waste being only 1.3 times that caused by overissue.

Conclusions and Recommendations

Only a fraction of the food waste currently being generated during field training exercises can be attributable to the disparity between the relatively small troop headcounts at remote sites and the current tray pack size. Thus, based on the preceding analysis, it is recommended that the current tray pack size be retained, but that the module size be reduced from 36 persons to 18 persons. This recommendation is further supported by the fact that, if another size tray pack is adopted, substantial retooling costs (none of which have been incorporated into the above food item costs) would have to be incurred by both the tray pack manufacturer and the food packers. In order to accurately compare the three alternative tray pack cans which include production costs, conversion costs and waste factors, Table II shows the 12/18 tray pack can in an 18-person meal module configuration is the most economical.

TABLE II. Per Meal Costs (dollars).

Tray Pack Size	Production	Conversion	Waste	Effective Cost/Meal
12/18 (36 meal mod)	2.32	0.00	0.57	2.89
12/18 (18 meal mod)	2.32	0.00	0.36	2.68
6/9 (18 meal mod)	2.48	0.23	0.30	3.01
8/12 (18 meal mod)	2.42	0.23	0.84	3.49

AN ECONOMIC ANALYSIS
OF ALTERNATIVE TRAY PACK SIZES

INTRODUCTION

Background

In 1987, the Food Engineering Directorate of the U.S. Army Natick RD&E Center completed an analysis to determine the optimal meal module* configuration and to consolidate all of the tray pack components for supporting the field feeding requirements of today's modern Army. This study and its recommendations are documented in Technical Report NATICK/TR-87/045, titled *Meal Module, Tray Pack, 36-Persons.* This type of packaging approach for providing meals in the field would preclude shortages of individual meal components, in that all of the items necessary for a given meal would be contained in the module. Based upon the results of this study, the 36-person module was adopted as the standard packaging configuration for tray packs when providing meals to troops under field feeding conditions.

An implicit assumption in that study was that the physical size of the tray pack was held constant, in terms of the volume of food it contained. (However, the number of portions in a given tray pack varied, that number being dependent on the specific food item it contained.) The justification for holding the tray pack size constant emanated from the fact that the tray pack concept for field feeding had initially been developed around the half-steam table tray size. This size was an industry standard, commercially available, and was compatible with the design of the Mobile Kitchen Trailer (MKT) and the Kitchen Company Level Field Feeding (KCLFF) where the meals were prepared and subsequently served directly from the tray packs.

Troops at meal times would pass through the MKT or KCLFF in a manner similar to a self-serve cafeteria line, selecting those items that they wanted from the tray packs on the serving line. Another underlying assumption in that study was that all of the troops that were organic to an MKT ate their meals at the MKT site. For this reason, only aggregate unit troop strengths were used in the analysis. Consequently, the analysis did not adequately address the issue of feeding troops in smaller units that were located at sites remote from the MKT and the food preparation area.

Excessive Food Waste

Since the adoption of the 36-person meal module, concerns have been raised about excessive food waste being generated when tray pack meals are served in the field.

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*A meal module is defined as a complete meal that includes food, disposables, and eatingware for a predetermined number of soldiers.

The food waste generated when the tray pack meals are served can occur for several reasons, including (1) troop dissatisfaction with meals, and (2) an excess number of portions being prepared because of difference in the module and/or tray pack size in comparison to the number of troops being fed at the remote locations.

Troop dissatisfaction can result from low acceptability of a particular food item. Another potential source of dissatisfaction is lack of variety; that is, the item, while being of acceptable quality, is served repeatedly day after day due to the lack of availability of alternate tray pack items in the military's logistical distribution system. In both these instances, the troops tend to eat less than the prescribed portion size, or prefer to skip the item or meal altogether. This is especially true during short duration field exercises.

A second source of food waste can be the result of a disparity between the number of portions being issued to a feeding site and the number of troops actually at that site.

Troop feeding is currently done in significantly smaller groups than initially conceived and at locations remote from the MKT or KCLFF. Consequently, the present module/tray pack configuration may not be congruent with the current feeding requirements, in terms of the incremental number of meals that can be delivered to individual feeding sites. As a result, too many portions are frequently provided to these sites and food is wasted.

Objectives

This study focuses on this second potential cause of food waste. In other words, Are there alternative tray pack sizes that would be more economical? It should be noted that the selection of an "optimal" tray pack size is not independent of the size of the module.

An objective of this study, therefore, is to determine if there is an alternative meal module/tray pack size configuration that will reduce the total overall cost of feeding troops in the field by decreasing the amount of food waste that is currently being generated by the present meal module and/or tray pack size.

A second objective of this study is to determine the overall impact of downsizing the tray pack can. Specifically addressed are the additional costs to the tray pack manufacturer and food processors that would be required to convert present production capacity to the new tray pack size. The impact of a new tray pack size on the incremental storage and transportation costs are also discussed.

DATA COLLECTION

Tray Pack Field Feeding Menu

The 14-day tray pack menu, which was utilized in the 1987 study to determine the optimal module size, has been adopted for this evaluation. The menu, in its entirety, is presented in Appendix A. Also included in Appendix A is a Menu Item List, which is basically a summary of all of the individual food items that are included in the menu. This analysis was performed prior to the adoption of the 10-day tray pack menu.

On-Site Data Collection

Data were collected during a trip to Fort Carson, CO in June 1989 on troop strength profiles at remote feeding areas for different types of combat units. These data are presented in Appendix B.

When reviewing these troop strength profiles, an important point to remember is that combat units today are required to be highly mobile and flexible. As a result, the profiles presented in Appendix B should not be considered fixed. An example of how much these profiles can vary is shown for the Mechanized Battalion Task Force, where the number of remote feeding sites can vary anywhere from 18 to 32 depending on the specific mission of the unit.

Additional data were also collected on actual food waste that was generated during a field training exercise. The results of this data collection are tabulated in detail in Appendix C. In addition, a summary of this data is presented and discussed in the Analysis section of this report.

However, the amount of food waste data that were able to be collected was very limited. Under combat conditions, and even in a training exercise, the proper disposal of food waste is not paramount to the success of a unit's mission. Consequently, while data were collected on food waste returned by the remote feeding sites to the food preparation area, residual food was also disposed of at the remote site and not recorded. The amount of waste recorded was, in these cases, estimated through conversations with the soldiers returning the insulated food containers.

Another concern in analyzing this data is the actual definition of food waste. For example, the first time unopened tray packs came back from a remote site they would be marked with a "1". These containers would then be reheated a second time and again distributed to a feeding site. If a tray back came back from a site already marked with a "1", then it was discarded, even though it still had not been opened. For purposes of this evaluation, it does not appear reasonable to record the latter case as food waste and the former as not. Such an approach would only tend to cloud the issues addressed in this study. For consistency, therefore, any food returned from a remote site was categorized as waste.

As inferred from the above discussion, there are limitations on the food waste data that were collected. Nevertheless, a comparison between the actual waste observed and the projected waste due to the mismatch between module/tray pack configuration and the number of troops to be fed at a site provides an interesting perspective on the causes of food waste.

One final point on the subject of reducing excessive food waste. Under the current scenario of feeding troops in small groups at remote sites, it was observed that field kitchens are now issuing meals to these remote sites in half module increments to reduce the amount of food waste generated. In those instances where it was determined that a half module would suffice, the cooks broke down a full module and repacked its components into two separate half modules.

Present System of Field Feeding

Two different methods of preparing food in the field were observed. In the first method, which was used by the majority of the MKT's visited, tray packs were heated centrally in the MKT. The tray packs were then placed in insulated containers and distributed to the troops at the remote sites to be eaten when the troops had the opportunity to do so. If the troops were engaged in combat for an extended period of time, then the meals remained at the site and were subsequently eaten cold (or luke warm at best) after the mission was completed.

The other method of feeding consisted of sending the tray packs out unheated to the remote sites along with a cook. With this approach, the meals were heated only after the troops had completed their mission, thereby assuring them a hot meal.

Visits to the Tray Pack Manufacturer and Food Processors

A plant visit was made to Central States Can Company to discuss the ramifications of changing the tray pack can size. Estimates were obtained for one-time conversion costs for new tooling and projected tray pack costs for the two new sizes of interest. An assumption made here was that the new tray pack sizes would be made from the same material and in a similar manner as the current one in production.

Plant visits were also made to two food processors that are currently producing a majority of the tray pack items. These processors were Vanee Foods Company and E. Huttenbauer and Son, Inc. As with the can manufacturer, estimates were obtained for both retooling costs and incremental unit costs that would be attributable to the new tray pack sizes.

An important assumption that was made in developing these costs was that, regardless of the tray pack size selected by the Army, only one size would be adopted and put into production.

STUDY DESIGN AND ANALYSIS

Definitions

In this analysis, for purposes of consistency, the various factors to be defined will follow the structure developed in the 1987 study.

Excess Portions. Excess portions are defined as the difference between the actual number of portions in the tray pack containers that are provided in a meal module and the meal module size. Using the same example that was previously developed in the 1987 report:

Meal Module Size	= 45
Portions per Tray Pack	= 25
Tray Packs Required per Module	= 2
Excess Portions	= (25x2) - 45 = 5

Overissue Portions. Overissue portions are defined as the difference between the actual number of portions stated in the meal module and the size of the force to be supported. Again, using the same example that was developed previously in the 1987 report:

Meal Module Size	= 45
Force to be Subsisted	= 77
Meal Modules Required	= 2
Overissue Portions	= (45x2) - 77 = 13

Tray Pack Alternatives

Two alternative tray pack sizes were evaluated and compared to the present tray pack size in terms of excess costs per meal, overissue costs per meal, and most important, total food item cost per meal. The two sizes that were evaluated are both smaller than the current size tray pack. Specifically, these two sizes are 50% capacity and 67% capacity of the current tray pack size.

Diseconomies of scale are most likely to occur with the smaller size tray packs. Inasmuch as there were no current cost data available on items packaged in these smaller units, a cost sensitivity analysis was conducted on each size to reflect a potential increase in costs that would be associated with these smaller size tray packs.

Thus, in addition to a 50% reduction in item costs, which corresponds linearly with the 50% capacity tray pack, additional analyses were also conducted with costs for this size tray pack at 60% and 70% of the current unit size. In a similar manner, the 67% capacity unit was costed out at 67%, 75%, and 80% of the costs of the existing tray pack items.

Module Alternatives

Although the goal of this study is to focus on alternative tray pack sizes, such a study would not be meaningful if the module size was held

constant due to the dependence between tray pack size and module size in terms of total costs. Thus, in addition to varying the tray pack sizes, alternative module sizes are also evaluated with the goal of obtaining the lowest possible total food item cost per meal. Specifically, the modules included in this study were the 12-, 18-, 24-, 30-, and 36-person sizes.

Assumptions

The following assumptions have been made as part of this analysis:

1. The menu adopted is the same 14-day menu that was used in the 1987 study titled *Meal Module, Tray Pack, 36-Persons.*

2. The prices for the current tray pack items are those obtained from the Federal Supply Catalog Price List, FSC Group 89 Subsistence, dated 1 July 1988, unless otherwise stated.

3. The portions used for each of the existing tray pack items are those obtained from Information Paper STRNC-WTP, dated 28 July 1988, unless otherwise stated.

4. The costs of the condiments and the items in the accessory pack are not included in this analysis. The vast majority of items in both of these categories are individually packaged items. The waste that would be associated with these specific items would therefore be minimal. In addition, the cost of these items is very minimal in comparison to the total cost of the 14-day menu.

5. The module packaging costs are not included in this analysis. It is anticipated that, as with the tray pack items, some diseconomies of scale may occur with the smaller size modules.

6. The size and the number of portions of the non-tray pack items in the menu were held constant for this analysis. For example, the No. 10 cans of canned fruit such as peaches and pears and the cans of the various powdered beverages did not vary with the different tray pack sizes. This assumption is considered to be appropriate for a study of this nature, in that it provides a conservative approach. If a smaller size tray pack is economically feasible under these conditions, then additional savings will be realized when these non-tray pack items are appropriately scaled down.

Methodology

A Lotus-123 spreadsheet program was developed to evaluate the various costs per meal that would be associated with the different combinations of tray pack sizes, relative tray pack costs, and module sizes. The three major components of the program are as follows:

1. The 14-Day Menu
2. The Menu Item List
3. The Troop Headcount Profiles from Ft. Carson.

To obtain the average food item costs per meal for the 14-day menu, the Menu Item List was updated each time to reflect the appropriate changes in unit costs and portion sizes for each of the different combinations of tray pack sizes and their respective costs. The 14-day menu was then automatically updated, through the Lotus program, to reflect these changes, and subsequently used to "feed" each of the different troop profiles on which data were collected. The excess costs per meal, overissue costs per meal, and total food item costs per meal were then calculated for each profile, and average costs in each category obtained. A detailed description of the Lotus-123 program is presented in Appendix D.

Cost Analysis

Using the above described procedure, the average costs per meal for each of three different costs of interest were calculated for each of the different combinations of tray pack sizes, tray pack costs, and module sizes. The results of these calculations are presented in Table 1 (Average Excess Costs per Meal), Table 2 (Average Overissue Costs per Meal), and Table 3 (Average Total Costs per Meal).

TABLE 1. Average Excess Costs per Meal.

Tray Pack Capacity	Tray Pack Cost	Module Size 12	18	24	30	36
100%	100% (Current)	0.90	0.14	0.74	0.50	0.09
50%	50%	0.89	0.08	0.19	0.46	0.09
50%	60%	1.03	0.08	0.22	0.52	0.09
50%	70%	1.16	0.08	0.26	0.58	0.09
67%	67%	0.29	0.62	0.00	0.48	0.12
67%	75%	0.30	0.68	0.00	0.52	0.12
67%	80%	0.30	0.73	0.00	0.54	0.12

The differences in excess costs, by definition, (see Figure 1), are attributable to the relationship between module size and the number of portions per tray pack or other container (for example, No. 10 cans). Whenever the ratio of portions per container to module size is not a whole integer, excess costs are incurred. Thus, as seen in Table 1, the combination of the 67% capacity tray pack (which has either 8 or 12 portions per tray) and No. 10 cans (with 24 portions per can) in combination with the 24-person module yields no excess costs.

With the 36-person module, the current 100% capacity tray pack (with either 12 or 18 portions per tray) and the 50% capacity tray pack (with either 6 or 9 portions per tray) incur no excess costs themselves. Here, the excess costs are attributable to the No. 10 cans which have 24 portions each, thereby requiring two cans to fulfill the module's requirements. At the 67% capacity tray pack (with either 8 or 12 portions per tray) excess costs are incurred

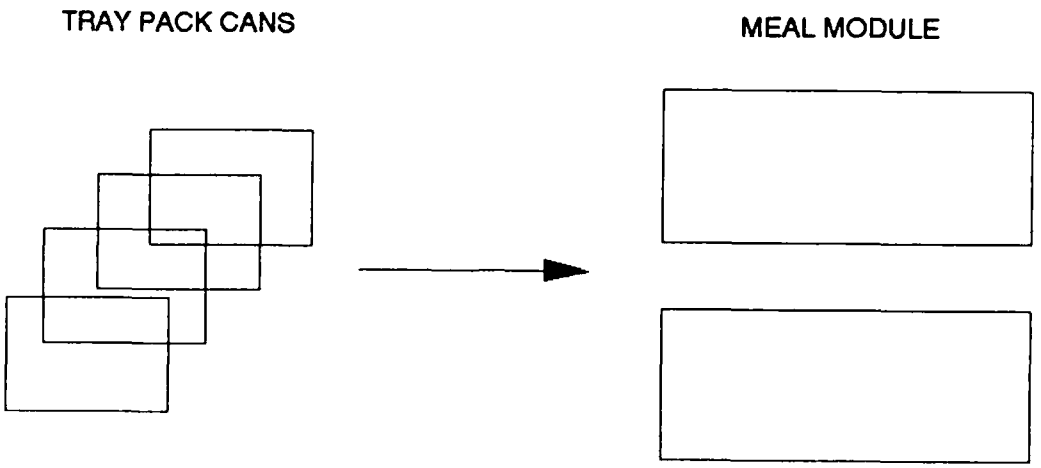

FIGURE 1: GRAPHICAL DEFINITION OF EXCESS

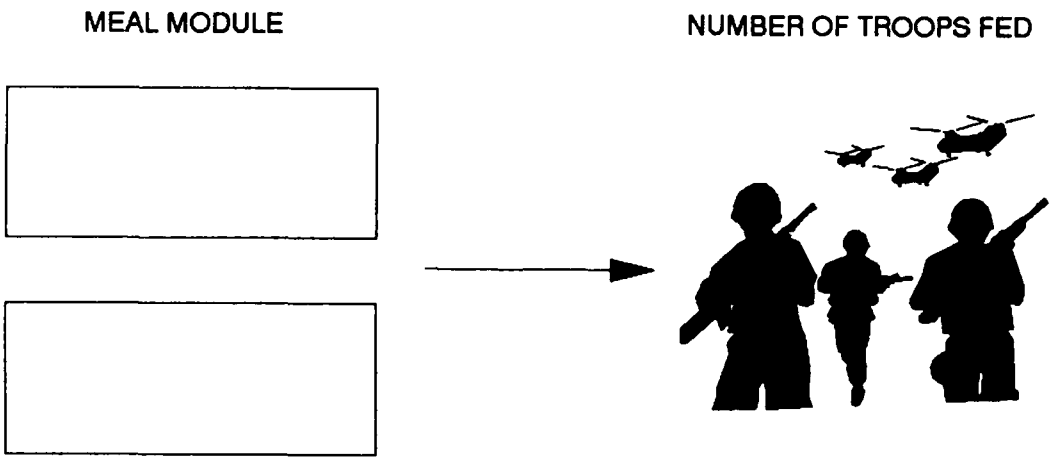

FIGURE 2: GRAPHICAL DEFINITION OF OVERISSUE

only by those tray pack items which have 8 portions per tray. In these instances, 5 tray packs of these items are required to fulfill the 36-person module's requirements.

Obviously, there is less flexibility with the larger module sizes in terms of matching module size with the troop profiles eating at the remote sites. Overissue costs are, by definition, (see Figure 2), those that occur as a result of the relationship between the meal module size and the troop profiles. This fact is reflected in the increasing overissue costs associated with the larger module sizes, as shown in Table 2.

TABLE 2. Average Overissue Costs per Meal.

Tray Pack		Module Size				
Capacity	Cost	12	18	24	30	36
100%	100% (Current)	0.13	0.22	0.31	0.40	0.48
50%	50%	0.13	0.22	0.31	0.40	0.49
50%	60%	0.16	0.25	0.36	0.46	0.57
50%	70%	0.18	0.29	0.41	0.53	0.63
67%	67%	0.13	0.22	0.31	0.40	0.48
67%	75%	0.14	0.25	0.34	0.44	0.54
67%	80%	0.15	0.25	0.36	0.46	0.57

As shown in Table 3, under the existing meal module/tray pack configuration, the average total costs per meal is $2.24 (100% capacity, 100% cost, and 36-person module). Of the 35 different combinations of tray pack sizes, tray pack costs and module sizes, only 6 yield average costs per meal which are lower than the current configuration costs.

TABLE 3. Average Food Item Costs per Meal.

Tray Pack		Module Size				
Capacity	Cost	12	18	24	30	36
100%	100% (Current)	2.69	2.02	2.71	2.56	2.24
50%	50%	2.69	1.96	2.16	2.52	2.24
50%	60%	3.13	2.28	2.54	2.94	2.61
50%	70%	3.58	2.61	2.91	3.35	2.98
67%	67%	2.08	2.50	1.97	2.54	2.26
67%	75%	2.28	2.76	2.18	2.80	2.50
67%	80%	2.40	2.93	2.31	2.95	2.64

The lowest average food item costs per meal combinations are the 18-person module with the 50% (6/9) tray pack size and 50% cost ($1.96 per meal), and the 24-person module with the 67% (8/12) tray pack size and 67% cost ($1.97 per meal). Both of these combinations represent approximately a 12.5% reduction in food item costs, but neither takes into consideration any diseconomies of scale that most likely will occur with the smaller size tray packs nor the conversion costs associated with industrial retooling. Any increases associated with these diseconomies of scale will result in a reduction in the potential savings.

The next lowest average food item costs per meal is the 18-person module with the current tray pack size ($2.02). This combination represents a savings of 9.8% over the current configuration. In addition, under this scenario, the potential increase in costs resulting from diseconomies of scale would be minimal in that these costs would only pertain to the unitizing of the module and not to the tray pack packaging. While this is not the lowest cost per meal configuration, it is only 3.1% more than the 18-person module with a 50%/50% tray pack can and only 2.5% more than the 24-person module with a 67%/67% tray pack can which, as stated above, does not reflect any diseconomics of scale.

Food Waste Analysis

Table 4 shows a summary comparison between the actual food waste observed during the field exercises at Fort Carson, CO and the waste projected to occur from an excessive number of portions issued. The excessive number of portions in this case is attributed to the mismatch between module size and the number of troops eating at the different remote sites. Inasmuch as the MKT's were issuing food to the remote sites in half module increments, the 18-person module was used in determining the projected excess food costs. (A more detailed presentation of the food waste data that were collected is presented in Appendix C.)

TABLE 4. Comparison of Actual and Projected Food Waste.

Item	Sample Size	Portions Issued	Portions Wasted	Overissue	Ratio Portions Wasted/Overissue
Grits & Bacon	10	558	213	66	3.2
Corned Beef Hash	10	558	138	66	2.1
Blueberry Dessert	10	558	94	66	1.4
Egg & Bacon Omelet	3	180	54	17	3.2
Sausage Links	1	36	20	1	20.0
Spiced Cake	2	108	6	11	0.5
Potato w/Bacon	2	144	66	16	4.1
Apple Coffee Cake	1	72	6	6	1.0
Dessert Items	1	738	106	83	1.3
Non-Dessert Items	26	1476	491	16	3.0
Total	39	2214	597	249	2.4

In 38 out of the 39 samples taken (spiced cake being the one exception) actual food waste exceeded projected waste. In aggregate, as seen in Table 4, the total food waste actually generated was 2.4 times as great as that projected to result from the module/tray pack configuration that was being used during the exercise. Thus, based on this limited sample size, a significant percentage of the food waste from tray pack items is occurring for reasons other than that caused by the tray pack size or the module size being too large.

It is also interesting to note in Table 4 that a much higher ratio of actual food waste was generated for the entree and starch items (3.0) as compared to the dessert items (1.3). The cause for this difference can most likely be attributed to the soldiers' preference for the dessert items in comparison to the other tray pack items that were served.

Storage and Distribution Costs

With the existing module/tray pack configuration, the average cost for the 36 meals in a module is $95.43. There are 12 modules packed to a pallet, bringing the average cost per pallet to $1,145.16.

The average cost to transport a pallet of nonperishable food from CONUS to Europe is estimated to be $100.00 per pallet. This assumes that the shipments are done in 40-foot containers, with 36 pallets per container. Thus, under these assumptions, the transportation cost to Europe represents only 8.7% of the module cost. If, in fact, the smaller size tray packs require no additional cubic feet of storage, then their respective transportation costs will remain unchanged. *Similarly, storage costs will remain constant in all cases.*

However, even if the smaller size tray packs required additional storage space, the overall effect on the total cost of the modules would be minimal. For example, a 25% increase in space requirements (which is probably greater than the additional cubic feet that would be actually required under any circumstances), would translate into only a 2.2% increase in total per meal costs. Therefore, the incremental distribution and storage costs associated with the smaller size tray packs will not affect the decision as to which tray pack size to adopt.

Impact on Container Manufacturer

A trip was made to Central States Can Company, which is the current producer of tray pack containers and covers, to discuss the impact of a smaller tray pack on Central States' manufacturing operation. The change to a different tray pack size would result in one-time retooling costs to permit existing equipment to produce either of the two proposed tray pack sizes. These retooling costs are estimated to be $1.0 million for coil stock, which is currently being used (see Table 6).

As expected, the smaller size tray packs would cost less per unit than the current container. The estimated cost for each proposed size is shown in Table 5.

TABLE 5. Estimated Tray Pack Container and Lid Costs.

Tray Pack Size	Cost/1000 (Body and Lid)	Cost as a Percent of Current Sizes
100% (12/18)	$1,025.39	100%
50% (6/9)	$785.50	76%
67% (8/12)	$887.67	86%

A critical assumption made by Central States in developing these cost estimates is that *only one size of tray pack would be manufactured* to satisfy all of the tray pack requirements.

The unit costs shown in Table 5 reveal very high diseconomies of scale with the smaller tray pack units. These higher costs are attributable to the additional steel requirements and to the fact that it takes approximately the same amount of equipment time to draw a container, regardless of its size. For this same reason, labor costs per unit would also remain relatively constant, regardless of the size of the tray pack container being manufactured.

Impact on Food Packers

In order to understand the process requirements for tray pack food items, trips were made to Vanee Foods and E. Huttenbauer & Son--the two current major manufacturers of tray pack products. The production of tray packs is a five stage operation, as seen in Figure 3.

COOK & ASSEMBLE FOODS ---> FILL TRAY PACKS ---> SEAL LIDS ---> RETORT ---> DRY & PACK

Figure 3. Process flow chart for tray packs.

The first (Cook and Assemble) and fourth (Retort) stages would not be affected to any appreciable extent, in terms of incurring either additional one-time capital costs or having any diseconomies of scale associated with the production of the proposed smaller tray pack sizes (assuming that the shape of the tray pack does not change), and that at least one of the dimensions of the can (either length or width) remain constant, relative to the present tray pack size. The second stage (Fill) and the last stage (Dry and Pack) would have slight diseconomies of scale due to the necessity to handle more trays for a given quantity of food. For example, if a new size holds 50% capacity of the current tray pack container, twice as many trays need to be handled to package a given quantity of food. However, neither of these stages would require any one-time retooling costs if the smaller size tray pack were to be adopted.

The major source of diseconomies of scale with smaller size tray packs would occur in the Seal Lids Operation (Stage 3). Here, substantially more linear inches must be sealed with the smaller units in order to package a given quantity of food. Both of the plants that were visited are now running their sealing operations at, or very near, capacity. Thus, if a smaller size tray pack were to be adopted, additional sealer capacity time would be required, and consequently, each firm would have to purchase an additional sealer, which is estimated to cost between $200,000 and $225,000. In addition, retooling costs, estimated to be between $25,000 and $50,000 for the existing sealer at each plant would be necessary. Based on the above analysis of the tray pack operation with each of the two manufacturers, the overall diseconomies of scale associated with the production of smaller size tray pack items are estimated to be between 20% and 40%. (For example, if a tray pack item in the current size container costs $10.00 to produce, then that same item in a tray pack which has 50% capacity of the current size unit would cost $6.00 to $7.00, as compared to $5.00 if there were no diseconomies of scale.) Table 6 shows the average industry conversion costs.

TABLE 6. Industry Conversion Costs (average).

Operation		Cost
Retooling Coil Stock		$1,000,000
Modifying Sealer Machines		$37,500
Additional Sealer Machines		$212,500
	Total:	$1,250,000

There are presently few commercial applications for the current size tray pack. However, a potential commercial market is anticipated with the smaller size units. With the smaller the tray pack, the higher the probability of both the potential for that market and its respective size. However, any estimate as to the size of the commercial market for these items is purely speculative at this time.

In order to compare the three alternative tray pack can sizes, per meal costs have been established (to include the diseconomies of scale associated with the smaller size cans). These would include production costs, conversion costs, and a waste factor for module overissue and tray pack can excess (see Table 7). The conversion costs shown in Table 6 have been spread over a 10-year period for this comparison. The economic impact would be the real cost to the government in terms of procurement costs and the losses incurred from feeding a particular tray pack can size to an average force structure profile.

The 18-person meal module has the lowest overissue cost ($.22) per meal within the waste factor. As the above data shows, the 12/18 size tray pack can configured in the 18-person meal module would be 7.2% cheaper than the current 36-person meal module configuration. It would also be 10.9% cheaper than the 6/9 size tray pack can and 23.2% cheaper than the 8/12 size tray pack can when configured in the 18-person meal module.

TABLE 7. Per Meal Costs (dollars).

Tray Pack Size	Production	Conversion	Effective (Dollars)	Cost/Meal
12/18 (36 meal mod)	2.32	0.00	0.57	2.89
12/18 (18 meal mod)	2.32	0.00	0.36	2.68
6/9 (18 meal mod)	2.48	0.23	0.30	3.01
8/12 (18 meal mod)	2.42	0.23	0.84	3.49

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Substantial waste is currently being generated whenever tray packs are used to feed troops in the field during training exercises. The causes for this waste are numerous, and include the following:

1. Poor acceptability of some tray pack items.

2. Lack of availability in the variety of tray pack items, causing some items to be served too often.

3. Short duration of training exercises, permitting troops to skip meals and/or to eat snack foods that they bring with them in lieu of the tray packs.

4. Combination feeding, whereby A-rations, MRE's, and T-rations are fed during the same day. This is the field feeding cycle used at Ft. Carson, CO. It is locally known as "ACT" (A-ration for breakfast or dinner, C-ration (MRE) for lunch, and T-ration for dinner or breakfast). In this situation, the troops would generally eat less of the tray pack meal knowing that they would eat an A-ration sometime during the day.

5. Excessive portions due to the difference in tray pack size and the meal module size.

6. Overissue incurred by the difference in meal module size and the troop headcounts at the remote sites.

Although this study addressed only the last two issues, the first two cannot be ignored. (The third issue, skipping meals is beyond the Army's control and will continue to exist during short duration exercises.)

From the foregoing analysis, it appears that food waste will be reduced approximately 12.5% if the current tray pack size and module size are each reduced by 50%. While actual food waste will be reduced by this percentage, the actual cost savings will be significantly less due to the diseconomies of scale associated with the smaller tray packs and modules.

However, substantial savings (that is, a 9.8% reduction over the present configuration) can result from the existing tray pack size if it is unitized in an 18-person module, instead of the current 36-person module. This appears to be the most economical alternative because there is no diseconomies of scale relative to the tray pack itself.

Recommendations

Based on the previous analysis and discussion, it is recommended that the current tray pack size be maintained, but that the module size be reduced from 36 persons to 18 persons. It is interesting to note that field dining facility managers, in an effort to reduce food waste are, in fact, doing just this when

delivering tray pack meals to remote sites (i.e., module sizes are rounded up to the next highest half module increment, rather than whole module increment, as indicated in the number of modules issued to the different sites in Appendix E).

Although this combination of tray pack size and module size does not yield the lowest average food item cost per meal for the different alternatives evaluated (from the LOTUS spreadsheet model), it is the lowest cost per meal in actuality. The analysis of industry conversion costs and the diseconomies of scale (Table 7) clearly showed the current 12/18 tray pack can size is the most cost-effective alternative.

APPENDIX A.

14-Day Baseline Menu and Menu Item List

14-DAY BASELINE MENU

Day	Meal	Item Description	NSN Number
1	BRK	Pineapple w/Syrup	8915-00-170-5127
		Eggs/Ham	8940-01-151-4184
		Canadian Bacon	8905-01-151-2488
		Escalloped Potatoes	8940-01-147-6362
		Grape, Juice, Instant	8915-01-010-1471
1	DIN	Meatloaf w/Mushroom Gravy	8940-01-151-6919
		Potatoe Salad	8940-01-162-2178
		Peas and Mushrooms	8915-01-157-2281
		Pears w/Syrup	8915-00-616-0223
		Beverage Base, Powder, Lemon-Lime	8960-00-404-6063
2	BRK	Fruit Cocktail w/Syrup	8915-00-286-5482
		Beef Stew	8940-01-009-7993
		Mixed Vegetables	8915-01-150-2858
		Chocolate Pudding	8940-01-159-1569
		Orange, Juice, Instant	8915-00-530-3414
2	DIN	Lasagna w/Meat Sauce	8940-01-124-4544
		Green Beans	8915-01-150-2861
		Spice Cake	8920-01-144-0565
		Peaches w/Syrup	8915-00-577-4203
		Beverage Base, Powder, Grape	8960-00 404-6061
3	BRK	Pineapple w/Syrup	8915-00-170-5127
		Chicken ala King	8940-01-154-3525
		Buttered Noodles	8940-01-151-5844
		Apple Dessert	8940-01-147-7855
		Grape, Juice, Instant	8915-01-010-1471
3	DIN	Sliced Pork w/Gravy	8940-01-010-4843
		Escalloped Potatoes	8940-01-147-6362
		Peas and Mushrooms	8915-01-157-2281
		Fruit Cocktail w/Syrup	8915-00-286-5482
		Beverage Base, Powder, Orange	8960-00-404-6064
4	BRK	Pears w/Syrup	8915-00-616-0223
		Creamed Ground Beef	8940-01-151-5845
		Potatoes w/ Butter Sauce	8940-01-152-6821
		Blueberry Cake	8920-01-166-3576
		Orange, Juice, Instant	8915-00-530-3414

14-DAY BASELINE MENU

Day	Meal	Item Description	NSN Number
4	DIN	Frankfurters in Brine	8905-01-124-8628
		Beans w/Pork	8915-01-147-7853
		Mixed Vegetables	8915-01-150-2858
		Peaches w/Syrup	8915-00-577-4203
		Beverage Base, Powder, Lemon-Lime	8960-00-404-6063
5	BRK	Pineapple w/Syrup	8915-00-170-5127
		Ham Slices	8905-01-143-3326
		Sweet Potatoes, Glazed	8940-01-153-0710
		Cherry Dessert	8915-01-010-1471
5	DIN	Beef Strips w/Green Peppers	8940-01-123-2191
		Buttered Noodles	8940-01-151-5844
		Whole Kernel Corn	8915-01-151-6908
		Apple Dessert	8940-01-147-7855
		Beverage Base, Powder, Lemon-Lime	8960-00-404-6063
6	BRK	Peaches w/Syrup	8915-00-577-4203
		Eggs/Ham	8940-01-151-4184
		Pork Sausage Links	8905-01-151-6920
		Escalloped Potatoes	8940-01-147-6362
		Orange, Juice, Instant	8915-00-530-3414
6	DIN	Lasagna w/Meat	8940-01-124-4544
		Green Beans	8915-01-150-2861
		Applesauce	8915-00-127-8272
		Spice Cake	8920-01-144-0565
		Beverage Base, Powder, Grape	8960-00-404-6061
7	BRK	Pineapple w/Syrup	8915-00-170-5127
		Beef Stew	8940-01-009-7993
		Green Beans	8915-01-150-2861
		Blueberry Dessert	8940-01-151-5464
		Grape Juice, Instant	8915-01-010-1471
7	DIN	Chicken W/Gravy	8940-01-153-8540
		Buttered Noodles	8940-01-151 5844
		Carrots, Sliced	8915-01-151-6914
		Pears, w/Syrup	8915-00-616-0223
		Beverage Base, Powder, Orange	8960-00-404-6064

14-DAY BASELINE MENU

Day	Meal	Item Description	NSN Number
8	BRK	Peaches w/Syrup	8915-00-577-4203
		Chicken ala King	8940-01-154-3525
		Potatoes w/Butter Sauce	8940-01-152-6821
		Apple Dessert	8940-01-147-7855
		Orange Juice, Instant	8915-00-530-3414
8	DIN	Beef w/Barbecue Sauce	8940-01-010-0881
		Buttered Noodles	8940-01-151-5844
		Peas and Mushrooms	8915-01-157-2281
		Chocolate Pudding	8940-01-159-1569
		Beverage Base, Powdered, Lemon-Lime	8960-00-404-6063
9	BRK	Pears w/Syrup	8915-00-616-0223
		Canadian Bacon	8905-01-151-2488
		Sweet Potatoes, Glazed	8940-01-153-0710
		Cherry Dessert	8940-01-152-5507
		Grape Juice, Instant	8915-01-010-1471
9	DIN	Roast Beef w/Mushroom Gravy	8940-01-150-2857
		Escalloped Potatoes	8940-01-147-6362
		Carrots, Sliced	8915-01-151-6914
		Peaches w/Syrup	8915-00-577-4203
		Beverage Base, Powdered, Lemon	8960-00-404-6062
10	BRK	Fruit Cocktail w/Syrup	8915-00-286-5482
		Eggs/Ham	8940-01-151-4184
		Pork Sausage Links	8905-01-151-6920
		Potatoes w/Butter Sauce	8940-01-152-6821
		Orange Juice, Instant	8915-00-530-3414
10	DIN	Beef w/Barbecue Sauce	8940-01-010-0881
		Macaroni and Cheese	8940-01-150-2860
		Mixed Vegetables	8915-01-150-2858
		Applesauce	8915-00-127-8272
		Beverage Base, Powdered, Grape	8960-00-404-6061
11	BRK	Pineapple W/Syrup	8915-00-170-5127
		Chicken ala King	8940-01-154-3525
		Buttered Noodles	8940-01-151-5844
		Apple Dessert	8940-01-147-7855
		Grape Juice, Instant	8915-01-010-1471

14-DAY BASELINE MENU

Day	Meal	Item Description	NSN Number
11	DIN	Meat Loaf w/Mushroom Gravy	8940-01-151-6919
		Potatoes w/Butter Sauce	8940-01-151-6821
		Whole Kernel Corn	8915-01-151-6908
		Peaches w/Syrup	8915-00-577-4203
		Beverage Base, Powder, Orange	8960-00-404-6064
12	BRK	Fruit Cocktail w/Syrup	8915-00-286-5482
		Creamed Ground Beef	8940-01-151-5842
		Potatoes w/Butter Sauce	8940-01-152-6821
		Cherry Dessert	8940-01-152-5507
		Orange Juice, Instant	8915-00-530-3414
12	DIN	Beef Strips w/Green Peppers	8940-01-123-2191
		Macaroni and Cheese	8940-01-150-2860
		Mixed Vegetables	8915-01-150-2858
		Applesauce	8915-01-127-8272
		Beverage Base, Powder, Lemon-Lime	8960-00-404-6063
13	BRK	Pineapple w/Syrup	8915-00-170-5127
		Beef Stew	8940-01-009-7993
		Green Beans	8915-01-150-2861
		Blueberry Dessert	8940-01-151-5464
		Grape Juice, Instant	8915-01-010-1471
13	DIN	Turkey Slices w/Gravy	8940-01-143-3328
		Sweet Potatoes, Glazed	8940-01-153-0710
		Whole Kernel Corn	8915-01-151-6908
		Chocolate Pudding	8040-01-159-1569
		Beverage Base, Powder, Orange	8960-01-404-6064
14	BRK	Fruit Cocktail w/Syrup	8915-00-286-5482
		Ham Slices	8905-01-143-3326
		Escalloped Potatoes	8940-01-147-6362
		Cherry Dessert	8940-01-152-5507
		Orange Juice, Instant	8915-00-530-3414
14	DIN	Roast Beef w/Mushroom Gravy	8940-01-150-2857
		Buttered Noodles	8940-01-151-5844
		Applesauce	8915-00-127-8272
		Spice Cake	8920-01-144-0565
		Beverage Base, Powder, Grape	8960-00-404-6061

MENU ITEM LIST

Item Description	NSN Number	Portions/Units
Apple Dessert	8940-01-147-7855	18
Applesauce	8915-00-127-8272	24
Beans w/ Pork	8915-01-147-7853	18
Beef Stew	8940-01-009-7993	18
Beef Strips w/Green Peppers	8940-01-123-2191	18
Beef w/Barbecue Sauce	8940-01-010-0881	18
Beverage Base, Powdered, Grape	8960-00-404-6061	1
Beverage Base, Powdered, Lemon	8960-00-404-6062	1
Beverage Base, Powdered, Lemon-Lime	8960-00-404-6063	1
Beverage Base, Powdered, Orange	8960-00-404-6064	1
Blueberry Cake	8920-01-166-3576	18
Blueberry Dessert	8940-01-151-5464	18
Buttered Noodles	8940-01-151-5844	18
Canadian Bacon	8905-01-151-2488	18
Carrots, Sliced	8915-01-151-6914	18
Cherry Dessert	8940-01-152-5507	18
Chicken ala King	8940-01-154-3525	12
Chicken w/Gravy	8940-01-153-8540	18
Chocolate Pudding	8940-01-159-1569	18
Creamed Ground Beef	8940-01-151-5845	18
Eggs/Ham	8940-01-151-4184	18
Escalloped Potatoes	8940-01-147-6362	18
Frankfurters in Brine	8905-01-124-8628	18
Fruit Cocktail w/Syrup	8915-00-286-5482	24
Grape Juice, Instant	8915-01-010-1471	24
Green Beans	8915-01-150-2861	18
Ham Slices	8905-01-143-3326	18
Lasagna w/Meat Sauce	8940-01-124-4544	12
Macaroni and Cheese	8940-01-150-2860	18
Meat Loaf w/Mushroom Gravy	8940-01-151-6919	18
Mixed Vegetables	8915-01-150-2858	18
Orange Juice, Instant	8915-00-530-3414	24
Peaches w/Syrup	8915-00-577-4203	24
Pears, w/Syrup	8915-00-616-0223	24
Peas and Mushrooms	8915-01-157-2281	18
Pineapple w/Syrup	8915-00-170-5127	24
Pork Sausage Links	8905-01-151-6920	18
Potatoes w/ Butter Sauce	8940-01-152-6821	18
Potatoe Salad	8940-01-162-2178	18
Roast Beef w/Mushroom Gravy	8940-01-150-2857	18
Sliced Pork w/Gravy	8940-01-010-4843	18
Spice Cake	8920-01-144-0565	18
Sweet Potatoes, Glazed	8940-01-153-0710	18
Turkey Slices w/Gravy	8940-01-143-3328	18
Whole Kernel Corn	8915-01-151-6908	18

APPENDIX B.

Troop Headcount Profiles for Field Feeding

TABLE B-1

Troop Headcount Profile Data

Feeding Preparation Level Description: Division Artillery

Number of Feeding Sites: 10 Profile Code: P1

Unit Feeding Level	Troop Head Count	Number of Modules*
A-1	60	2.0
A-2	60	2.0
B-1	45	1.5
B-2	45	1.5
C-1	45	1.5
C-2	45	1.5
TOC	70	2.0
Field Trains (HHB)	80	2.5
Combat Trains (SVC)	60	1.5
Radar	9	0.5
TOTALS	519	16.5

* Represents actual number of modules issued to each unit.

TABLE B-2

Troop Headcount Profile Data

Feeding Preparation Level Description: Field Artillery Battalion (5/29)

Number of Feeding Sites: 8 Profile Code: P2

Unit Feeding Level	Troop Head Count	Number of Modules
HQ	108	3.0
A Co.	81	2.5
B Co.	77	2.5
C Co.	96	3.0
SVC	120	4.0
Fist	24	1.0
Radar 1	6	0.5
Radar 2	8	0.5
TOTALS	520	17.0

TABLE B-3

Troop Headcount Profile Data

Feeding Preparation Level: Air Defense Artillery

Number of Feeding Sites: 6 Profile Code: P3

Unit Feeding Level	Troop Head Count	Number of Modules
HHB	130	4.0
A Co.	120	4.0
B Co.	120	4.0
C Co.	120	4.0
Radar	35	1.0
Stinger	10	1.0
TOTALS	535	18.0

TABLE B-4

Troop Headcount Profile Data

Feeding Preparation Level: Armor Battalion

Number of Feeding Sites: 10 Profile Code: P4

Unit Feeding Level	Troop Head Count	Number of Modules
A Co.	57	2.0
B Co.	55	2.0
C Co.	60	2.0
D Co.	72	2.0
TOC	30	1.0
HHC	180	5.0
Scouts	28	1.0
Mortars	24	1.0
UMCP	50	2.0
Support	50	2.0
TOTALS	606	20.0

TABLE B-5

Troop Headcount Profile Data

Feeding Preparation Level: Heavy Mechanized Battalion Task Force

Number of Feeding Sites: 18 Profile Code: P5

Unit Feeding Level	Troop Head Count	Number of Modules
(P5 Levels Not Available)	10	0.5
	10	0.5
	10	0.5
	16	0.5
	16	0.5
	45	1.5
	150	4.5
	40	1.5
	15	0.5
	153	4.5
	107	3.0
	107	3.0
	63	2.0
	94	3.0
	50	1.5
	12	0.5
	15	0.5
	15	0.5
TOTALS	928	30.0

NOTE: Some training exercises can have up to 32 feeding sites for this particular force structure.

TABLE B-6

Troop Headcount Profile Data

Feeding Preparation Level: Armor Battalion (1/12)

Number of Feeding Sites: 12 Profile Code: P6

Unit Feeding Level	Troop Head Count	Number of Modules
Scouts	17	0.5
UMCP	41	1.5
A Co. 3/68	70	2.0
Engineers	17	0.5
TOW	22	1.0
Vulcan	15	0.5
ALOC	15	0.5
Medics	13	0.5
B Co. 2/12	70	2.0
Field Trains	81	2.5
A Co. 2/12	80	2.5
TOC	39	1.5
TOTALS	480	15.5

TABLE B-7

Troop Headcount Profile Data

Feeding Preparation Level: Light Mechanized Battalion Task Force

Number of Feeding Sites: 11 Profile Code: P7

Unit Feeding Level	Troop Head Count	Number of Modules
C Co. - Mech	85	2.5
D Co. - Mech	75	2.5
E Co. - Mech	107	3.0
C Co. - Tank	64	2.0
D Co. - Tank	65	2.0
Mortars	47	1.5
Scouts	26	1.0
Combat Trains	66	2.0
TOC	26	1.0
ADA	51	2.0
Field Trains	50	2.0
TOTALS	662	21.5

TABLE B-8

Troop Headcount Profile Data

Feeding Preparation Level: Armor Battalion

Number of Feeding Sites: 10 Profile Code: P8

Unit Feeding Level	Troop Head Count	Number of Modules
A Co.	65	2.0
B Co.	63	2.0
C Co.	65	2.0
D Co.	68	2.0
TOC	35	1.0
Team Beast	35	1.0
Scouts	25	1.0
Anti-tank	21	1.0
Field Trains	81	2.5
ALOC	22	1.0
TOTALS	480	15.5

TABLE B-9

Troop Headcount Profile Data

Feeding Preparation Level: Infantry Battalion Task Force

Number of Feeding Sites: 12 Profile Code: P9

Unit Feeding Level	Troop Head Count	Number of Modules
A Co.	90	3.0
B Co.	54	2.0
C Co.	106	3.0
E Co.	68	2.0
B Co. 1/77	70	2.0
HHC	100	3.0
Scouts	25	1.0
Mortars	24	1.0
Field Trains	100	3.0
TOC	35	1.0
C Co. 1/77	75	3.0
Support	50	2.0
TOTALS	797	26.0

APPENDIX C.

Food Waste Data

FOOD WASTE DATA

(Collected at Fort Carson, CO)

Headcount	Issued	Portions Wasted	Portions Overissue	Percent Wasted	Percent Overissue	Ratio Portions Wasted/Overissue
Item: Grits and Bacon						
70	72	9	2	12.5%	2.8%	4.5
22	36	18	14	50.0%	38.9%	1.3
15	18	3	3	16.7%	16.7%	1.0
15	18	18	3	100.0%	16.7%	6.0
13	18	0	5	0.0%	27.8%	0.0
87	90	12	3	13.3%	3.3%	4.0
70	72	18	2	25.0%	2.8%	9.0
81	90	81	9	90.0%	10.0%	9.0
80	90	36	10	40.0%	11.1%	3.6
39	54	18	15	33.3%	27.8%	1.2
Totals:	558	213	66	38.2%	11.8%	3.2
Item: Corned Beef Hash						
70	72	9	2	12.5%	2.8%	4.5
22	36	18	14	50.0%	38.9%	1.3
15	18	6	3	33.3%	16.7%	2.0
15	18	15	3	83.3%	16.7%	5.0
13	18	0	5	0.0%	27.8%	0.0
87	90	9	3	10.0%	3.3%	3.0
70	72	27	2	37.5%	2.8%	13.5
81	90	18	9	20.0%	10.0%	2.0
80	90	36	10	40.0%	11.1%	3.6
39	54	0	15	0.0%	27.8%	0.0
Totals:	558	138	66	24.7%	11.8%	2.1
Item: Blueberry Dessert						
70	72	9	2	12.5%	2.8%	4.5
22	36	10	14	27.8%	38.9%	0.7
15	18	0	3	0.0%	16.7%	0.0
15	18	0	3	0.0%	16.7%	0.0
13	18	0	5	0.0%	27.8%	0.0
87	90	0	3	0.0%	3.3%	0.0
70	72	39	2	54.2%	2.8%	19.5
81	90	36	9	40.0%	10.0%	4.0
80	90	0	10	0.0%	11.1%	0.0
39	54	0	15	0.0%	27.8%	0.0
Totals:	558	94	66	16.8%	11.8%	1.4

FOOD WASTE DATA

(Collected at Fort Carson, CO)

Headcount	Issued	Portions Wasted	Portions Overissue	Percent Wasted	Percent Overissue	Ratio Portions Wasted/Overissue
Item: Egg & Bacon Omelet						
35	36	6	1	16.7%	2.8%	6.0
62	72	24	10	33.3%	13.9%	2.4
66	72	24	6	33.3%	8.3%	4.0
Totals:	180	54	17	30.0%	9.4%	3.2
Item: Sausage Links						
35	36	20	1	55.6%	2.8%	20.0
Totals:	36	20	1	55.6%	2.8%	20.0
Item: Spiced Cake						
35	36	0	1	0.0%	2.8%	0.0
62	72	6	10	8.3%	13.9%	0.6
Totals:	108	6	11	5.6%	10.2%	0.5
Item: Potato with Bacon						
62	72	42	10	58.3%	13.9%	4.2
66	72	24	6	33.3%	8.3%	4.0
Totals:	144	66	16	45.8%	11.1%	4.1
Item: Apple Coffee Cake						
66	72	6	6	8.3%	8.3%	1.0
Totals:	72	6	6	8.3%	8.3%	1.0

APPENDIX D.

Lotus-123 Program Description

LOTUS-123 PROGRAM DESCRIPTION

TROOP HEAD COUNT PROFILE

Description

Listed here are the projected troop headcounts for each of the different remote sites that are provided meals from an MKT. Using the average costs per meal for the entire 14-day menu and its particular packaging configuration (that is, the specific combination of tray pack size and module size), the pertinent costs per meal are calculated for each remote site. These remote site meal costs are subsequently totaled and averaged for the entire organization. The average food cost/meal (H37), overissue cost/meal (G37), excess cost/meal (F37), and total food item cost/meal (E37) are the primary outputs of this program.

Location

This section of the program is located in the spreadsheet in the area bounded by Cells A10, H10, A37, H37.

Revisions

To determine the average costs per meal for feeding a particular troop configuration, insert in Column C, beginning in Row 13, the troop headcounts at each of the remote sites. If, for reference purposes, a brief description of each remote unit is desired, it can be inserted in Column A, in the row corresponding to the respective headcount. The total troop headcount should be verified with the column total (Cell C33).

Presently, the program can accommodate up to 18 different remote feeding sites, but it can be expanded if additional sites are required to accommodate a particular organizational structure or field problem by positioning the cursor anywhere within the existing column, inserting the additional rows desired (/,Worksheet,Insert,Row, Outline Number of Rows) anywhere within the existing column (that is, between Rows 13 and 30), and then copying the formulae that calculate the pertinent meal costs in Columns D, E, F, and G into the new rows that have been added. Be sure to verify that the formulae that total each column (Row 33) include the new rows that have been added. (This is done automatically, if the new rows have been inserted within the existing column, but not necessarily if the new rows are inserted at either the beginning or the end of the column.)

LOTUS-123 PROGRAM DESCRIPTION

DAILY COST CALCULATIONS

Description

This section calculates both the daily meal costs for each of the days in the 14-day menu, as well as the average meal costs over the entire menu cycle. These average meal costs are then used as an input with the troop headcount profiles to determine the relevant meal costs associated with each organization.

Location

This section of the program is located in the spreadsheet in the area bounded by Cells A40, G40, A77, and G77.

Revisions

Given the existing 14-day menu, there is no need to change any portion of this section. The only input that the operator is required to specify here is the module size, which is in Cell C42.

Other revisions to this section are necessary only if the menu is increased beyond the current 14-day menu. In that case, the spreadsheet needs to be expanded by adding more rows to accommodate the additional days.

LOTUS-123 PROGRAM DESCRIPTION

14-DAY MENU

Description

Each of the menu items that comprise each of the two meals (that is, breakfast and dinner) that are served daily during the 14 days are listed here. Each meal typically consists of five components: an entree, a starch, a vegetable, a dessert, and a beverage.

Location

This section of the program is located in the spreadsheet in the area bounded by Cells A81, Q81, A333, and Q333.

Revisions

If an existing menu item is replaced entirely with a new item, then the description needs to be updated in each of the meals where that item is used. The Where Used File provides the locations within the 14-day menu where each item is served. Changes in the menu item prices, however, are not made in this section of the program. Price changes are made in the Menu Item List. With this approach, the prices are then automatically updated in the menu wherever the item is served. (The cell reference in the price column of an item refers to the location of that item's price in the Menu Item List).

LOTUS-123 PROGRAM DESCRIPTION

MENU ITEM LIST (RAW INGREDIENT FILE)

Description

Each of the different menu items that are served in the 14-day menu cycle are listed here in alphabetical order. Although a list of disposables and condiments that are part of each module have been listed here, these items have not been included in the pricing of the 14-day menu.

Location

This section of the program is located in the spreadsheet in the area bounded by Cells A336, Q336, A403, and Q403.

Revisions

To update a price on an existing menu item, simply replace the existing price with the new price. This new price will then automatically be updated for each day and meal where the item is used.

If an existing menu item is to be completely replaced with a new menu item, type in the new menu item in the same row where the item to be replaced is located. Next, insert an additional row in the Menu Item List where the new item would be located alphabetically. Using the "Move" function, move the entire row that contains the new item, including the pertinent information in the Where Used File, to the new row that has been added. Finally, delete the blank row that was left when the new item was moved.

LOTUS-123 PROGRAM DESCRIPTION

WHERE USED LIST

Description

This portion of the program is for reference only and is not linked to any other section of the program. The purpose of this section is to provide a simple means to identify the different days and meals in which each of the menu items is served. Thus, if a menu item is to be replaced, the Where Used List can quickly show where the substitutions have to be made.

Location

This section of the program is located in the spreadsheet in the area bounded by Cells V336, X336, V384, and X384.

Revisions

Revisions here are necessary only if a new menu item is not a direct substitute for an existing item. In this case, each of the days and meals in which the new item is served is specified on the corresponding row where the new item has been listed in the Menu Item List.

APPENDIX E.

Cost per Meal Data

TABLE E-1

Cost per Meal Data for Various Feeding Site Profiles

Configuration:

Tray Pack Size: 12/18 Cost: 100% Current Module Size: 12

Profile Code	Head Count	No. of Sites	Costs per Meal Overissue	Excess	Food	Total
P1	519	10	.07	.86	1.66	2.59
P2	520	8	.06	.86	1.66	2.59
P3	535	6	.02	.84	1.66	2.52
P4	606	10	.12	.88	1.66	2.67
P5	928	18	.17	.91	1.66	2.74
P6	480	12	.25	.95	1.66	2.87
P7	662	11	.21	.93	1.66	2.80
P8	480	10	.17	.91	1.66	2.74
P9	797	12	.14	.90	1.66	2.70
		Average:	.13	.90	1.66	2.69

TABLE E-2

Cost per Meal Data for Various Feeding Site Profiles

Configuration:

Tray Pack Size: 12/18 Cost: 100% Current Module Size: 18

Profile Code	Head Count	No. of Sites	Costs per Meal Overissue	Excess	Food	Total
P1	519	10	.30	.14	1.66	2.10
P2	520	6	.13	.14	1.66	2.04
P3	535	6	.13	.13	1.66	1.92
P4	606	10	.21	.14	1.66	2.01
P5	480	12	.27	.14	1.66	2.07
P6	480	12	.27	.14	1.66	2.07
P7	662	11	.19	.14	1.66	1.99
P8	480	10	.27	.14	1.66	2.07
P9	797	12	.14	.13	1.66	1.93
		Average:	.22	.14	1.66	2.01

TABLE E-3

Cost per Meal Data for Various Feeding Site Profiles

Configuration:

Tray Pack Size: 12/18 Cost: 100% Current Module Size: 24

Profile Code	Head Count	No. of Sites	Costs per Meal Overissue	Excess	Food	Total
P1	519	10	.26	.72	1.66	2.64
P2	520	8	.26	.72	1.66	2.64
P3	535	6	.13	.67	1.66	2.46
P4	606	10	.38	.76	1.66	2.81
P5	928	18	.36	.76	1.66	2.78
P6	480	12	.33	.75	1.66	2.74
P7	662	11	.39	.77	1.66	2.82
P8	480	10	.33	.75	1.66	2.74
P9	797	12	.34	.75	1.66	2.76
		Average:	.31	.74	1.66	2.71

TABLE E-4

Cost per Meal Data for Various Feeding Site Profiles

Configuration:

Tray Pack Size: 12/18 Cost: 100% Current Module Size: 30

Profile Code	Head Count	No. of Sites	Costs per Meal Overissue	Excess	Food	Total
P1	519	10	.36	.49	1.66	2.51
P2	520	8	.35	.49	1.66	2.50
P3	535	6	.20	.45	1.66	2.32
P4	606	10	.15	.44	1.66	2.25
P5	928	18	.54	.54	1.66	2.74
P6	480	12	.62	.56	1.66	2.84
P7	662	11	.37	.49	1.66	2.53
P8	480	10	.62	.56	1.66	2.84
P9	797	12	.34	.49	1.66	2.49
		Average:	.40	.50	1.66	2.56

TABLE E-5

Cost per Meal Data for Various Feeding Site Profiles

Configuration:

Tray Pack Size: 12/18 Cost: 100% Current Module Size: 36

Profile Code	Head Count	No. of Sites	Costs per Meal Overissue	Excess	Food	Total
P1	519	10	.64	.09	1.66	2.40
P2	520	8	.52	.09	1.66	2.28
P3	535	6	.35	.08	1.66	2.10
P4	606	10	.31	.08	1.66	2.06
P5	928	18	.66	.10	1.66	2.42
P6	480	12	.83	.10	1.66	2.60
P7	662	11	.42	.09	1.66	2.16
P8	480	10	.33	.08	1.66	2.08
P9	797	12	.29	.08	1.66	2.03
		Average:	.48	.09	1.66	2.23

TABLE E-6

Cost per Meal Data for Various Feeding Site Profiles

Configuration:

Tray Pack Size: 6/9 Cost: 50% Current Module Size: 12

Profile Code	Head Count	No. of Sites	Costs per Meal Overissue	Excess	Food	Total
P1	519	10	.07	.86	1.67	2.60
P2	520	8	.06	.86	1.67	2.61
P3	535	6	.12	.88	1.67	2.67
P4	606	10	.12	.88	1.67	2.67
P5	928	18	.17	.91	1.67	2.75
P6	480	12	.25	.95	1.67	2.87
P7	662	11	.21	.93	1.67	2.81
P8	480	10	.17	.91	1.67	2.75
P9	797	12	.14	.90	1.67	2.71
		Average:	.13	.89	1.67	2.69

TABLE E-7

Cost per Meal Data for Various Feeding Site Profiles

Configuration:

Tray Pack Size: 6/9 Cost: 50% Current Module Size: 18

Profile Code	Head Count	No. of Sites	Costs per Meal			
			Overissue	Excess	Food	Total
P1	519	10	.30	.08	1.67	2.05
P2	520	8	.24	.08	1.67	1.99
P3	535	6	.13	.07	1.67	1.87
P4	606	10	.21	.08	1.67	1.96
P5	928	18	.21	.08	1.67	1.96
P6	480	12	.27	.08	1.67	2.02
P7	662	11	.19	.08	1.67	1.94
P8	480	10	.27	.08	1.67	2.02
P9	797	12	.14	.07	1.67	1.88
		Average:	.21	.08	1.67	1.97

TABLE E-8

Cost per Meal Data for Various Feeding Site Profiles

Configuration:

Tray Pack Size: 6/9 Cost: 50% Current Module Size: 24

Profile Code	Head Count	No. of Sites	Costs per Meal			
			Overissue	Excess	Food	Total
P1	519	10	.26	.18	1.67	2.11
P2	520	8	.26	.18	1.67	2.11
P3	535	6	.13	.17	1.67	1.97
P4	606	10	.38	.19	1.67	2.24
P5	928	18	.36	.19	1.67	2.22
P6	480	12	.33	.19	1.67	2.19
P7	662	11	.39	.19	1.67	2.25
P8	480	10	.33	.19	1.67	2.19
P9	797	12	.34	.19	1.67	2.20
		Average:	.31	.19	1.67	2.17

TABLE E-9

Cost per Meal Data for Various Feeding Site Profiles

Configuration:

Tray Pack Size: 6/9 Cost: 50% Current Module Size: 30

Profile Code	Head Count	No. of Sites	Costs per Meal Overissue	Excess	Food	Total
P1	519	10	.36	.45	1.67	2.48
P2	520	8	.35	.45	1.67	2.47
P3	535	6	.20	.42	1.67	2.29
P4	606	10	.15	.41	1.67	2.23
P5	928	18	.54	.49	1.67	2.70
P6	480	12	.63	.51	1.67	2.81
P7	662	11	.37	.46	1.67	2.50
P8	480	10	.63	.51	1.67	2.81
P9	797	12	.34	.45	1.67	2.46
		Average:	.40	.46	1.67	2.53

TABLE E-10

Cost per Meal Data for Various Feeding Site Profiles

Configuration:

Tray Pack Size: 6/9 Cost: 50% Current Module Size: 36

Profile Code	Head Count	No. of Sites	Costs per Meal Overissue	Excess	Food	Total
P1	519	10	.65	.09	1.67	2.41
P2	520	8	.53	.09	1.67	2.29
P3	535	6	.35	.08	1.67	2.10
P4	606	10	.31	.08	1.67	2.06
P5	928	18	.66	.10	1.67	2.43
P6	480	12	.83	.10	1.67	3.60
P7	662	11	.42	.09	1.67	2.18
P8	480	10	.33	.08	1.67	2.08
P9	797	12	.29	.08	1.67	2.04
		Average:	.49	.09	1.67	2.25

TABLE E-11

Cost per Meal Data for Various Feeding Site Profiles

Configuration:

Tray Pack Size: 6/9 Cost: 60% Current Module Size: 12

Profile Code	Head Count	No. of Sites	Costs per Meal			
			Overissue	Excess	Food	Total
P1	519	10	.08	.99	1.95	3.02
P2	520	8	.08	.99	1.95	3.02
P3	535	6	.02	.96	1.95	2.93
P4	606	10	.14	1.02	1.95	3.11
P5	928	18	.19	1.05	1.95	3.19
P6	480	12	.29	1.09	1.95	3.33
P7	662	11	.25	1.07	1.95	3.25
P8	480	10	.20	1.05	1.95	3.20
P9	797	12	.16	1.03	1.95	3.14
		Average:	.16	1.03	1.95	3.13

TABLE E-12

Cost per Meal Data for Various Feeding Site Profiles

Configuration:

Tray Pack Size: 6/9 Cost: 60% Current Module Size: 18

Profile Code	Head Count	No. of Sites	Costs per Meal			
			Overissue	Excess	Food	Total
P1	519	10	.35	.08	1.95	2.38
P2	520	8	.28	.08	1.95	2.31
P3	535	6	.15	.07	1.95	2.17
P4	606	10	.25	.08	1.95	2.28
P5	928	18	.24	.08	1.95	2.27
P6	480	12	.32	.08	1.95	2.35
P7	662	11	.22	.08	1.95	2.25
P8	480	10	.32	.08	1.95	2.35
P9	797	12	.16	.08	1.95	2.19
		Average:	.25	.08	1.95	2.28

TABLE E-13

Cost per Meal Data for Various Feeding Site Profiles

Configuration:

Tray Pack Size: 6/9 Cost: 60% Current Module Size: 24

Profile Code	Head Count	No. of Sites	Costs per Meal Overissue	Excess	Food	Total
P1	519	10	.30	.22	1.95	2.47
P2	520	8	.30	.22	1.95	2.47
P3	535	6	.15	.20	1.95	2.30
P4	606	10	.44	.23	1.95	2.62
P5	928	18	.42	.22	1.95	2.56
P6	480	12	.39	.22	1.95	2.56
P7	662	11	.46	.23	1.95	2.64
P8	480	10	.39	.22	1.95	2.56
P9	797	12	.40	.23	1.95	2.58
		Average:	.36	.22	1.95	2.54

TABLE E-14

Cost per Meal Data for Various Feeding Site Profiles

Configuration:

Tray Pack Size: 6/9 Cost: 60% Current Module Size: 30

Profile Code	Head Count	No. of Sites	Costs per Meal Overissue	Excess	Food	Total
P1	519	10	.42	.51	1.95	2.88
P2	520	8	.41	.51	1.95	2.87
P3	535	6	.24	.47	1.95	2.66
P4	606	10	.17.	.46	1.95	2.58
P5	928	18	.64	.56	1.95	3.15
P6	480	12	.73	.58	1.95	3.26
P7	662	11	.44	.52	1.95	2.91
P8	480	10	.73	.58	1.95	3.26
P9	797	12	.40	.51	1.95	2.86
		Average:	.46	.52	1.95	2.94

TABLE E-15

Cost per Meal Data for Various Feeding Site Profiles

Configuration:

Tray Pack Size: 6/9 Cost: 60% Current Module Size: 36

Profile Code	Head Count	No. of Sites	Costs per Meal Overissue	Excess	Food	Total
P15	519	10	.76	.09	1.95	2.86
P2	520	8	.62	.09	1.95	2.66
P3	535	6	.41	.08	1.95	2.44
P4	606	10	.37	.08	1.95	2.40
P5	928	18	.77	.10	1.95	2.82
P6	480	12	.98	.10	1.95	3.03
P7	662	11	.49	.09	1.95	2.53
P8	480	10	.39	.08	1.95	2.42
P9	797	12	.34	.08	1.95	2.37
		Average:	.57	.09	1.95	2.61

TABLE E-16

Cost per Meal Data for Various Feeding Site Profiles

Configuration:

Tray Pack Size: 6/9 Cost: 70% Current Module Size: 12

Profile Code	Head Count	No. of Sites	Costs per Meal Overissue	Excess	Food	Total
P1	519	10	.09	1.12	2.24	3.45
P2	520	8	.09	1.12	2.24	3.44
P3	535	6	.02	1.09	2.24	3.35
P4	606	10	.16	1.15	2.24	3.54
P5	928	18	.22	1.18	2.24	3.64
P6	480	12	.34	1.24	2.24	3.81
P7	662	11	.28	1.21	2.24	3.72
P8	480	10	.22	1.18	2.24	3.65
P9	797	12	.19	1.17	2.24	3.59
		Average:	.18	1.16	2.24	3.58

TABLE E-17

Cost per Meal Data for Various Feeding Site Profiles

Configuration:

Tray Pack Size: 6/9 Cost: 70% Current Module Size: 18

Profile Code	Head Count	No. of Sites	Costs per Meal			
			Overissue	Excess	Food	Total
P1	519	10	.40	.08	2.24	2.72
P2	520	8	.32	.08	2.24	2.64
P3	535	6	.17	.07	2.24	2.48
P4	606	10	.29	.08	2.24	2.61
P5	928	18	.28	.08	2.24	2.60
P6	480	12	.36	.08	2.24	2.68
P7	662	11	.26	.08	2.24	2.58
P8	480	10	.36	.08	2.24	2.68
P9	797	12	.19	.07	2.24	2.50
		Average:	.29	.08	2.24	2.61

TABLE E-18

Cost per Meal Data for Various Feeding Site Profiles

Configuration:

Tray Pack Size: 6/9 Cost: 70% Current Module Size: 24

Profile Code	Head Count	No. of Sites	Costs per Meal			
			Overissue	Excess	Food	Total
P1	519	10	.35	.25	2.24	2.83
P2	520	8	.47	.57	2.24	3.28
P3	535	6	.17	.23	2.24	2.64
P4	606	10	.51	.27	2.24	3.02
P5	928	18	.48	.26	2.24	2.98
P6	480	12	.45	.26	2.24	2.95
P7	662	11	.52	.27	2.24	3.03
P8	480	10	.45	.26	2.24	2.95
P9	797	12	.46	.26	2.24	2.96
		Average:	.41	.26	2.24	2.91

TABLE E-19

Cost per Meal Data for Various Feeding Site Profiles

Configuration:

Tray Pack Size: 6/9 Cost: 70% Current Module Size: 30

Profile Code	Head Count	No. of Sites	Costs per Meal Overissue	Excess	Food	Total
P1	519	10	.48	.57	2.24	3.29
P2	520	8	.47	.57	2.24	3.28
P3	535	6	.27	.53	2.24	3.04
P4	606	10	.20	.51	2.24	2.95
P5	928	18	.73	.63	2.24	3.60
P6	480	12	.84	.65	2.24	3.73
P7	662	11	.50	.58	2.24	3.32
P8	480	10	.84	.65	2.24	3.73
P9	797	12	.46	.57	2.24	3.27
		Average:	.53	.58	2.24	3.35

TABLE E-20

Cost per Meal Data for Various Feeding Site Profiles

Configuration:

Tray Pack Size: 6/9 Cost: 70% Current Module Size: 36

Profile Code	Head Count	No. of Sites	Costs per Meal Overissue	Excess	Food	Total
P1	519	10	.87	.09	2.24	3.20
P2	520	8	.70	.09	2.24	3.03
P3	535	6	.47	.08	2.24	2.79
P4	606	10	.42	.08	2.24	2.74
P5	928	18	.89	.10	2.24	3.23
P6	480	12	1.12	.10	2.24	3.46
P7	662	11	.56	.09	2.24	2.89
P8	480	10	.45	.08	2.24	2.77
P9	797	12	.39	.08	2.24	2.71
		Average:	.65	.09	2.24	2.98

TABLE E-21

Cost per Meal Data for Various Feeding Site Profiles

Configuration:

Tray Pack Size: 8/12 Cost: 67% Current Module Size: 12

Profile Code	Head Count	No. of Sites	Costs per Meal			
			Overissue	Excess	Food	Total
P1	519	10	.07	.28	1.66	2.01
P2	520	8	.06	.28	1.66	2.00
P3	535	6	.02	.27	1.66	1.95
P4	606	10	.11	.29	1.66	2.06
P5	928	18	.16	.30	1.66	2.12
P6	480	12	.25	.31	1.66	2.22
P7	662	11	.21	.30	1.66	2.17
P8	480	10	.17	.30	1.66	2.13
P9	797	12	.14	.29	1.66	2.09
		Average:	.13	.29	1.66	2.08

TABLE E-22

Cost per Meal Data for Various Feeding Site Profiles

Configuration:

Tray Pack Size: 8/12 Cost: 67% Current Module Size: 18

Profile Code	Head Count	No. of Sites	Costs per Meal			
			Overissue	Excess	Food	Total
P1	519	10	.30	.65	1.66	2.61
P2	520	8	.24	.63	1.66	2.53
P3	535	6	.13	.59	1.66	2.38
P4	606	10	.21	.62	1.66	2.49
P5	928	18	.21	.62	1.66	2.49
P6	480	12	.27	.64	1.66	2.57
P7	662	11	.19	.61	1.66	2.46
P8	480	10	.27	.64	1.66	2.57
P9	797	12	.14	.60	1.66	2.40
		Average:	.22	.62	1.66	2.50

TABLE E-23

Cost per Meal Data for Various Feeding Site Profiles

Configuration:

Tray Pack Size: 8/12 Cost: 67% Current Module Size: 24

Profile Code	Head Count	No. of Sites	Costs per Meal			
			Overissue	Excess	Food	Total
P1	519	10	.26	.00	1.66	1.92
P2	520	8	.26	.00	1.66	1.92
P3	535	6	.13	.00	1.66	1.79
P4	606	10	.38	.00	1.66	2.04
P5	928	18	.36	.00	1.66	2.02
P6	480	12	.33	.00	1.66	1.99
P7	662	11	.39	.00	1.66	2.05
P8	480	10	.33	.00	1.66	1.99
P9	797	12	.34	.00	1.66	2.00
		Average:	.31	.00	1.66	1.97

TABLE E-24

Cost per Meal Data for Various Feeding Site Profiles

Configuration:

Tray Pack Size: 8/12 Cost: 67% Current Module Size: 30

Profile Code	Head Count	No. of Sites	Costs per Meal			
			Overissue	Excess	Food	Total
P1	519	10	.36	.47	1.66	2.49
P2	520	8	.35	.47	1.66	2.48
P3	535	6	.20	.43	1.66	2.29
P4	606	10	.15	.42	1.66	2.23
P5	928	18	.54	.51	1.66	2.71
P6	480	12	.63	.53	1.66	2.82
P7	662	11	.37	.47	1.66	2.50
P8	480	10	.63	.53	1.66	2.82
P9	797	12	.34	.46	1.66	2.46
		Average:	.40	.48	1.66	2.54

TABLE E-25

Cost per Meal Data for Various Feeding Site Profiles

Configuration:

Tray Pack Size: 8/12 Cost: 67% Standard Module Size: 36

Profile Code	Head Count	No. of Sites	Costs per Meal			
			Overissue	Excess	Food	Total
P1	519	10	.64	.13	1.66	2.43
P2	520	8	.53	.12	1.66	2.31
P3	535	6	.35	.11	1.66	2.12
P4	606	10	.31	.11	1.66	2.08
P5	928	18	.66	.13	1.66	2.45
P6	480	12	.83	.14	1.66	2.63
P7	662	11	.42	.11	1.66	2.19
P8	480	10	.33	.11	1.66	2.10
P9	797	12	.29	.11	1.66	2.06
		Average:	.48	.12	1.66	2.26

TABLE E-26

Cost per Meal Data for Various Feeding Site Profiles

Configuration:

Tray Pack Size: 8/12 Cost: 75% Current Module Size: 12

Profile Code	Head Count	No. of Sites	Costs per Meal			
			Overissue	Excess	Food	Total
P1	519	10	.07	.29	1.84	2.20
P2	520	8	.07	.28	1.84	2.19
P3	535	6	.02	.28	1.84	2.14
P4	606	10	.13	.29	1.84	2.26
P5	928	18	.18	.30	1.84	2.32
P6	480	12	.27	.32	1.84	2.43
P7	662	11	.23	.30	1.84	2.37
P8	480	10	.18	.31	1.84	2.33
P9	797	12	.15	.30	1.84	2.29
		Average:	.14	.30	1.84	2.28

TABLE E-27

Cost per Meal Data for Various Feeding Site Profiles

Configuration:

Tray Pack Size: 8/12 Cost: 75% Current Module Size: 18

Profile Code	Head Count	No. of Sites	Costs per Meal Overissue	Excess	Food	Total
P1	519	10	.33	.72	1.84	2.89
P2	520	8	.26	.69	1.84	2.79
P3	535	6	.23	.66	1.84	2.63
P4	606	10	.24	.68	1.84	2.76
P5	928	18	.23	.69	1.84	2.76
P6	480	12	.30	.70	1.84	2.84
P7	662	11	.20	.68	1.84	2.72
P8	480	10	.29	.71	1.84	2.84
P9	797	12	.15	.66	1.84	2.65
		Average:	.25	.68	1.84	2.76

TABLE E-28

Cost per Meal Data for Various Feeding Site Profiles

Configuration:

Tray Pack Size: 8/12 Cost: 75% Current Module Size: 24

Profile Code	Head Count	No. of Sites	Costs per Meal Overissue	Excess	Food	Total
P1	519	10	.29	.00	1.84	2.13
P2	520	8	.29	.00	1.84	2.13
P3	535	6	.14	.00	1.84	1.98
P4	606	10	.42	.00	1.84	2.26
P5	928	18	.40	.00	1.84	2.24
P6	480	12	.37	.00	1.84	2.21
P7	662	11	.43	.00	1.84	2.27
P8	480	10	.37	.00	1.84	2.21
P9	797	12	.38	.00	1.84	2.22
		Average:	.34	.00	1.84	2.18

TABLE E-29

Cost per Meal Data for Various Feeding Site Profiles

Configuration:

Tray Pack Size: 8/12 Cost: 75% Current Module Size: 30

Profile Code	Head Count	No. of Sites	Costs per Meal Overissue	Excess	Food	Total
P1	519	10	.39	.51	1.84	2.74
P2	520	8	.39	.51	1.84	2.74
P3	535	6	.22	.48	1.84	2.54
P4	606	10	.16	.46	1.84	2.46
P5	928	18	.61	.55	1.84	3.00
P6	480	12	.69	.57	1.84	3.10
P7	662	11	.42	.51	1.84	2.77
P8	480	10	.69	.57	1.84	3.10
P9	797	12	.38	.50	1.84	2.72
		Average:	.44	.52	1.84	2.80

TABLE E-30

Cost per Meal Data for Various Feeding Site Profiles

Configuration:

Tray Pack Size: 8/12 Cost: 75% Standard Module Size: 36

Profile Code	Head Count	No. of Sites	Costs per Meal Overissue	Excess	Food	Total
P1	519	10	.71	.13	1.84	2.68
P2	520	8	.58	.12	1.84	2.54
P3	535	6	.39	.11	1.84	2.34
P4	606	10	.35	.11	1.84	2.30
P5	928	18	.73	.13	1.84	2.70
P6	480	12	.92	.14	1.84	2.90
P7	662	11	.46	.12	1.84	2.42
P8	480	10	.37	.11	1.84	2.32
P9	797	12	.32	.11	1.84	2.27
		Average:	.54	.12	1.84	2.50

TABLE E-31

Cost per Meal Data for Various Feeding Site Profiles

Configuration:

Tray Pack Size: 8/12 Cost: 80% Current Module Size: 12

Profile Code	Head Count	No. of Sites	Costs per Meal Overissue	Excess	Food	Total
P1	519	10	.07	.29	1.95	2.31
P2	520	8	.07	.29	1.95	2.31
P3	535	6	.02	.28	1.95	2.25
P4	606	10	.13	.30	1.95	2.38
P5	928	18	.19	.30	1.95	2.44
P6	480	12	.29	.32	1.95	2.56
P7	662	11	.24	.32	1.95	2.51
P8	480	10	.19	.31	1.95	2.45
P9	797	12	.16	.31	1.95	2.42
		Average:	.15	.30	1.95	2.40

TABLE E-32

Cost per Meal Data for Various Feeding Site Profiles

Configuration:

Tray Pack Size: 8/12 Cost: 80% Current Module Size: 18

Profile Code	Head Count	No. of Sites	Costs per Meal Overissue	Excess	Food	Total
P1	519	10	.34	.76	1.95	3.05
P2	520	8	.28	.73	1.95	2.96
P3	535	6	.14	.69	1.95	2.78
P4	606	10	.25	.72	1.95	2.92
P5	928	18	.24	.73	1.95	2.92
P6	480	12	.32	.74	1.95	3.01
P7	662	11	.22	.72	1.95	2.89
P8	480	10	.31	.75	1.95	3.01
P9	797	12	.16	.70	1.95	2.81
		Average:	.25	.73	1.95	2.93

TABLE E-33

Cost per Meal Data for Various Feeding Site Profiles

Configuration:

Tray Pack Size: 8/12 Cost: 80% Current Module Size: 24

Profile Code	Head Count	No. of Sites	Costs per Meal Overissue	Excess	Food	Total
P1	519	10	.31	.00	1.95	2.26
P2	520	8	.30	.00	1.95	2.25
P3	535	6	.15	.00	1.95	2.10
P4	606	10	.44	.00	1.95	2.39
P5	928	18	.42	.00	1.95	2.37
P6	480	12	.39	.00	1.95	2.34
P7	662	11	.45	.00	1.95	2.40
P8	480	10	.39	.00	1.95	2.34
P9	797	12	.40	.00	1.95	2.35
		Average:	.36	.00	1.95	2.31

TABLE E-34

Cost per Meal Data for Various Feeding Site Profiles

Configuration:

Tray Pack Size: 8/12 Cost: 80% Current Module Size: 30

Profile Code	Head Count	No. of Sites	Costs per Meal Overissue	Excess	Food	Total
P1	519	10	.42	.53	1.95	2.90
P2	520	8	.41	.53	1.95	2.89
P3	535	6	.24	.49	1.95	2.68
P4	606	10	.17	.48	1.95	2.60
P5	928	18	.63	.58	1.95	3.16
P6	480	12	.73	.60	1.95	3.28
P7	662	11	.43	.54	1.95	2.92
P8	480	10	.73	.60	1.95	3.28
P9	797	12	.40	.53	1.95	2.88
		Average:	.46	.54	1.95	2.95

TABLE E-35

Cost per Meal Data for Various Feeding Site Profiles

Configuration:

Tray Pack Size: 8/12 Cost: 80% Current Module Size: 36

Profile Code	Head Count	No. of Sites	Costs per Meal			
			Overissue	Excess	Food	Total
P1	519	10	.75	.13	1.95	2.83
P2	520	8	.61	.12	1.95	2.68
P3	535	6	.41	.11	1.95	2.47
P4	606	10	.36	.11	1.95	2.42
P5	928	18	.77	.13	1.95	2.85
P6	480	12	.97	.14	1.95	3.06
P7	662	11	.49	.12	1.95	2.56
P8	480	10	.39	.11	1.95	2.45
P9	797	12	.34	.11	1.95	2.40
		Average:	.57	.12	1.95	2.64

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